Charting a New Course for the Workplace with an Experience Framework

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Abstract. Like many, our company had a wealth of data about business users that included both big data by-products of operations (e.g., transactions) and outputs of traditional User Experience (UX) methods (e.g. interviews). To fully leverage the combined intelligence of this rich data, we had to aggregate big data and the outputs of traditional UX together. By connecting user stories to big data, we could test the generalizability of insights of qualitative studies against the larger world of business users and what they actually do. Similarly, big data benefited from the rich contextual insights found in more traditional UX studies. In this paper, we present a hybrid analysis approach that allowed us to leverage the combined intelligence of big data and outputs of UX methods. This approach allowed us to define an over-arching experience framework that provided actionable insights across the enterprise. We will discuss the underlying methodology, key learnings and how the work is revolutionizing experience decision making within the enterprise.

Keywords: UX Strategy, Big Data, Qualitative Data, User Research.

1 Introduction

Today's enterprise experience is often a fragmented one spanning multiple vendors, devices, products, and platforms. Enterprise users shift between very different interfaces which both frustrates them and makes them less efficient. This problem is exacerbated by the number of teams needed to develop and manage the enterprise experience, usually dozens of teams that span the globe who often operate independently of each other with little opportunity to discuss how the pieces fit together to shape the enterprise experience. After years of trying to wrestle the individual components of the enterprise experience into some semblance of a coherent whole, Intel IT took on an audacious goal to define a One IT experience that met employee needs and spanned its many products and services.

Like many businesses, our IT shop had a wealth of data about business users that included both big data by-products of operations (e.g., transactions) and by-products of traditional User Experience (UX) methods (e.g. interviews). This data included over 700 hours of user narratives, 20,000 surveys, and 18 million transactions. In this

paper, we present a hybrid analysis approach that allowed us to leverage the combined intelligence of big data and outputs of UX methods to define an over-arching experience framework that is being used to frame the One IT experience and seed human-centric transformation within the enterprise. We will discuss the underlying methodology, decompose the framework, and provide examples of how it is being used by the larger IT shop. Lastly, we will map the evolution of this effort over the last two years, share learnings and insights from our journey, and discuss the benefits of having a data-driven, re-usable and over-arching experience vision to guide enterprise decision-making.

2   Background

The data that enterprises collect every day is a storehouse of information about business users. It includes enterprise transactions, social data, support tickets, web logs, internet searches, clickstream data, and much more. Enterprises often manage data related to users in silos around infrastructure or application support. Similarly, analysis efforts focus on identifying problems related to the silo. Despite the rich information contained in this data, it is seldom used to improve the cross-enterprise experience of business users. Similar to how outside corporations examine the customer usage and interactions (e.g. Amazon, Google) to tailor the experience of purchasing or support for customers [1], enterprises could utilize knowledge about employees to enhance their business experience. However, tools to derive insights from big data are immature, especially with respect to UX; and analysis is hampered by the fact that most of this data is incompatible, incomprehensible, and messy to tie together. Further, even when this data is connected, big data is a backwards look at what has been. It cannot help enterprises fully understand what motivates the user behavior that they track or understand the full context in which it occurred. It does not help enterprises spot future looking opportunities for providing new value to their users, design a better solution, or better engage their users; and those places are where user experience has the most potential to add value to the enterprise. Big data lacks the contextual insights necessary for user-centric design and innovation.

Fortunately, where big data falls short, more traditional UX methods excel. Many UX methods rely on user narratives or observations that come from interviews, participatory design sessions, social media, or open-ended comments on surveys. They provide the qualitative color that yields the richer understanding of the holistic experience necessary for experience innovation or improvement. While traditional UX has a wide variety of methods (e.g. affinity diagrams, qualitative coding) to help UX professionals transform qualitative data into insights, they often only talk to small numbers of users which puts their generalizability in question in the corporate environment. In addition, the output of these methods does not lend itself to easy mixing with big data; nor are user narratives usually analyzed to the point where underlying structures are visible [2]. And, much like the transactional data the enterprise collects, data collected by UX professionals often remains siloed and is not re-used or used to form a larger understanding of the enterprise experience.

Leveraging the combined intelligence of big data and traditional UX data can be a daunting task as the data sets lack connections, or a way to pull together the diverse data and connect to specific aspects of the experience. Sociotechnical systems theory and macro ergonomics offer a way of connecting disparate data and provide a theoretical model for understanding the holistic user experience. They have been used successfully to holistically assess how well a technology fits its users and their work environment in relationship to enterprise priorities using diverse data types [3, 4]. They are especially useful for examining the business experience, as success requires IT understand how their "technology" impacts other elements of the user's world.

3   Growing an Experience Framework for the Enterprise

Back in 2011, IT, in partnership with HR, conducted over 200 interviews and 300 participatory design sessions focused on understanding the experience of employees. Since then, IT has increased the data set by 275%. The resulting multi gigabyte data set covers more than 100K employees across Intel and around the world, more than 700 hours of user stories and 18 million user transactions. It provides a high confidence, big data look at the business experience of employees, with the margin of error for the qualitative sample at less than .0495 and less than .0002 for the transactional sample [5]. Growing an experience framework from this massive data set necessitated that we explore and understand hidden relationships within the data sets. This section discusses the various methods that we used to elicit insights and describes the complexity of managing the underlying data.

3.1   Growing Connections in User Transactional Big Data

Enterprises collect large amounts of user data in terms of user demographics (e.g. role, organization) and as by-products of user transactions (e.g., portal usage, support tickets). Aggregated together they provide a holistic picture of the enterprise experience. While some data is considered confidential (e.g., age), other data is more publicly available (e.g., app use). Regardless, all data is typically protected in enterprises which necessitates both legal and privacy negotiation before aggregating the data. Prior to making any attempt to integrate the data sets, the raw data was anonymized by replacing all employee identifiers with an encrypted unique identifier.

When we initially went to gather the user data, we naively expected an enterprise-level data map that would help us locate relevant data. Instead, the process was a treasure hunt for data that could enrich our understanding of employee usage of enterprise products and services. The data was a mix of structured and unstructured data. Data formats were sometimes undocumented, and often inconsistent within and between datasets, with formatting often changing over time resulting in inconsistencies within a single dataset. The management of structured versus unstructured data meant tradeoffs between what was known and what could be feasibly stored or analyzed. We regularly exceeded the limits of our data storage and analysis capabilities and sometimes had to distill raw data into meaningful summary data. For instance, support tickets were reduced to total number of tickets and mean time between tickets. This

mountain of data was then distilled into individual employee usage footprints using the coded identifiers. By organizing the data in terms of individual users, we could more easily discern individual patterns, allowing us to more easily integrate new quantitative information as it was discovered.

3.2   Growing Connections in the User Stories

User narratives were captured through interviews, contextual inquiry, participatory design sessions, support tickets, and surveys. Open-ended questions framed discussion of the enterprise experience spanning key sociotechnical elements related to the user's environment, technology, social setting, and organization. The qualitative data provided rich, near verbatim narratives of users' experience. As with earlier work, we took the narratives as a direct representation of experience or critical part of a user's underlying mental model [2]. Each user narrative was associated with an anonymous identifier to connect the narratives to the quantitative data.

We manually coded user narratives using a mix of exploratory and structured coding. For the free-form narratives, we started with the smallest actionable chunks (e.g. low-level requirements) and built the coding structure from the bottom up rather than pre-defining the coding. A single narrative was coded at a time, with the exploratory coding structure iteratively refined as analysis progressed. One coder coded the majority of the narratives, with one other coder doing the exploratory coding for several dozen. Additionally there were several feeder coders who helped build the structured branches of the model (e.g., social networks). Coders regularly met and went thru an affinity diagram type activity [7] to consolidate coding structures. The narratives guided the coding structure but we also coded certain attributes including

- Specifics of user activities (e.g. key steps, triggers, success criteria)
- If the narrative detailed a positive or negative incident from the user perspective
- Environmental factors (e.g., workspace, location)
- Underlying technology (e.g. suite of tools, enterprise system, process, or device)
- Individual user characteristics (e.g., attitudes, motivators)
- Social factors (e.g., social network)
- Organizational factors (e.g. how work was organized)

The final coding tree represented the users' over-arching mental model of the experience [6] and defined the experience users wanted the enterprise to deliver. It mapped patterns of user behavior and needs, with detail to get to requirements. We then looked for meta-patterns, or schemas shared by enterprise users, again using an affinity diagram type exercise [6] as a way of data sense-making. The derived meta-patterns became the foundation of the experience framework.

3.3   Discovering Patterns in the Combined Data

We then connected the narratives with our "big" enterprise data using the coded identifiers. Rather than merge the whole narratives as unstructured data, we defined summary measures based on the coding framework. These summary measures

connected the user stories with the larger dataset to help us discover patterns across datasets. For each node in the first few levels, we specified two summary measures: (1) total number of references coded for the node, and (2) number of references coded for the node that were negative (*i.e.*, pain point). Using correlational methods, mathematically best "fit" patterns were identified in the combined dataset based on similarities in how employees used and talked about enterprise products and services. We used non-parametric methods as the data was often non-normal. Cross-references between the datasets allowed us to find connections and validate our findings from other data sets [5]. This process was highly iterative with a continuous cycle of data and user research. By making the combined dataset a living thing, we could add in more as needed and it ensured the enterprise has a constant pulse of user needs, can strategically identify key opportunities, and can respond more quickly when new needs arise. The final best "fit" patterns became the building blocks of the experience framework and will be discussed more in the next section.

4   Bringing the Framework to Life with Stories

The experience framework is a conceptual map of the desired user experience and our intent was for the framework to become the common language and shared framework for designing and evaluating enterprise services for the Intel user. In order to facilitate the ability of product teams to use the framework, we introduced large-scale, layered storytelling to unify the supporting framework collateral. The underlying stories focus on particular elements of the dataset and ignore the rest. Strung together they map the desired enterprise experience but individually only tell a piece. The data set is too large and diverse to be told by a single story. Users of the experience framework take these stories and data to create their own stories relevant to their product; many stories are possible from the same data.

Different framework elements provide different insights. *Themes* define the enterprise experience vision that spans the many products and services provided by Intel IT. *Segments* define the user groups that must be taken into account when creating the enterprise experience, while *influencers* and *activities* help IT understand the role it plays in core enterprise tasks and its impact on the overall experience. Much has been learned about how to most effectively use this information with product teams and the collateral has iteratively evolved to better help teams make sense of the large dataset. Social media is used extensively to socialize the framework; training and workshops were developed to optimize its use by service and portfolio teams.

4.1   Experience Themes

Experience themes describe core user needs that transcend enterprise product or service boundaries. They help service and product teams understand the shared expectations that users have of both the enterprise experience as well as their individual product interactions. To increase the ease of applying a theme to a specific product, each theme was decomposed into *experience qualities* that describe the core theme

components and the strategic functionality necessary to bring them to life. They were packaged as quality "trading cards" and are used by teams while setting UX strategy and product roadmaps. Each card details the key use scenarios for that quality and proposed functionality. Experience qualities are further broken down into *experience elements* which document key usage scenarios and requirements users expect in products. This information was packaged in theme vision books and as 8x10 cards to facilitate use during face-to-face design sessions. Three themes, 12 qualities, 59 experience elements and hundreds of requirements detail the desired over-arching experience and are summarized in Table 1.

Table 1. The themes and qualities that framed the envisioned experience [5]

Theme	Qualities
Feed Me I quickly and easily find the information I need to speed my work.	*Seamless* - Transparent. Integrated but flexible. *Simple* - Quick and easy. Language I can understand. *Meaningful* - Points me in the right direction, aids me in sense-making of information, and helps me work smarter. *Proactive* – Push me relevant information, make me aware of changes before they happen, and help me not be surprised.
Connect Me Connect me with the people, resources, and expertise I need to be successful.	*Purposeful* - Together we do work. *Easy* - Easy to work together and connect. *Cooperative* – Larger environment is supportive of me. *Presence* - Always present or at least I feel like you are near.
Know Me My information is known, protected and used to improve provided services.	*Recognized* - Know who I am. *Personalized* - Implicitly know what I need. *Customized* - Give me choices. *Private* - My information is under my control. Always protected and secure.

4.2 Experience Segments

Although themes are based on research with thousands of business users and apply to all enterprise products, how they apply to individual segments may vary. Segments provide target users for product teams to help them design for or tailor the experience for a particular audience. Six segments were identified with some segments further decomposed into sub-segments based on strength of within segment difference. Personas put a face to the experience segments, with each segment having a persona family that represents it. Supporting collateral for the personas summarize their goals and needs, key tasks and behaviors, pain points, usage of enterprise products, and relative priority of different experience qualities. The persona collateral ranges from posters, day-in-the-life, and trading cards.

4.3 Experience Influencers

Experience influencers help product teams assess the relative contribution of core elements of the enterprise world (e.g., IT, HR, physical workspace) on the holistic

enterprise experience and detail key pain points associated with a particular element. They also help teams identify potential partners when improving the experience and the potential impact of design changes.

4.4   Core Activities

Core activities provide product teams with specifics in how employees use and interact with enterprise products to accomplish shared tasks common to all employees and provide teams with high-level journey maps for various key activities such as "learn" or "find information." The activity journey maps also describe key segment differences relative to the activity, and provide a jumping off point.

5   Turning Understanding into Experience Transformation

An early adopter of the framework within Intel was the collaboration portfolio, which is comprised of a set of technologies that help Intel employees collaborate and includes social media, meeting tools, meetings spaces, and shared virtual workspaces. The impact of the framework has been wide-ranging, from setting portfolio UX strategy to vendor selection to helping an agile product team move faster. They evolved our original approach by combining use of the experience framework with elements of presumptive design [8]. The experience themes along with what was already known about a particular audience (e.g., field sales) formulated the starting "presumptions" on which designs were based. These starting presumptions were then validated using low cost methods and prototypes. In this section, we provide an overview of how the framework aided their team.

5.1   Providing a Future Vision of Collaboration

The framework provided significant insights about what Intel employees need from the enterprise collaboration experience. We provided teams with experience maps of the employee vision of the future for enterprise collaboration. The key needs included

- Seamless integration of tools, with a single place to access collaborations,
- Consumer grade experiences and increased sense-making across activity streams,
- Easy to find experts thru personalized recommendations and visible connections.
- Increased personal interactions with more in person collaboration, higher fidelity virtual alternatives, and increased access to video.

5.2   Defining Portfolio Strategy

The portfolio team began by identifying intersections between the framework and learnings from deep dive research done by portfolio UX teams. They posted a giant mind map of the experience themes up on the wall and, using sticky notes and highlighters, the team added in data from the deep dive research. The team then used

the mindmap and the user needs defined by experience qualities and elements to get the design process started. They isolated the elements relevant to collaboration and completed a heat map to identify how well today's capabilities are meeting target requirements for each collaboration element and how important each of those elements are to enterprise users. Answers to these questions helped the team set their UX roadmap and to prioritize where to focus first. For example, an element critical to initiating collaboration is "Bump into Interesting," which is about helping users serendipitously bump into information or people that are interesting and useful to them. In this case, the team found the portfolio didn't have solutions that were meeting the target requirements.

5.3   Speeding Agile Product Design

Both the framework and deep dive research repeatedly highlighted expert or expertise finding as a key need. The agile-based project team used the experience themes as a starting point for their efforts to rapidly go from concept discussions to prototype. During the initial team kickoff, the team found the strongest affinity with the Connect Me and Feed Me themes which focus on the need to quickly find information and connect employees with expertise. The associated element cards were a starting point for the team's Vision Quest activities and were a catalyst to helping the team form a design hypothesis around core presumptions of what features and capabilities should be included in the solution. Many of the early presumptions the team captured were based on previously gathered user data, and the experience elements.

A series of contextual scenarios were written from the design hypothesis which were then organized to form a high-level "narrative" or persuasive story of the product vision. These were then documented in a storyboard. The experience themes inspired many of the design patterns reflected in the proof-of-concept (POC) prototypes, and the storyboard contained a swim lane the team used to map the experience themes. To validate design presumptions, several intervals of presumptive design tests were conducted with end-users in tandem with design activities. Features not validated as "valuable" by users were removed from the storyboard and product vision. The vision iteratively became more defined and evolved into a 'lightweight' clickable prototype used to engage stakeholders and the technical team in feasibility discussions.

6   Discussion

The experience framework is an innovative way to represent UX research in a way that is consumable within the enterprise. It provides a foundational understanding of the needs of different kinds of employees in spaces that lack the time or resources to invest in more traditional user research. It also mitigates some of the key risks associated with presumptive design [8] by providing a larger holistic look at the experience space and overarching prioritization that helps prevent teams from focusing on the wrong solution to design or ignoring the needs of the larger experience. By taking

a "big data" approach to UX and creating an over-arching experience framework that represents core wants and needs employees have of enterprise products and services, we helped those responsible for setting enterprise strategy to incorporate UX more easily in their decision process. By mapping the intersection between experience qualities and elements against portfolio and product roadmaps, teams could identify potential gaps between the planned and desired experience of their products.

Over time, the framework has evolved into a common language and shared understanding of users and design needs that defines the One IT experience vision, spanning the many products and services provided by Intel IT. The supporting collateral helps set enterprise strategy and provides re-usable templates project teams can quickly adapt for their purposes. This shared vision is transforming enterprise products and services resulting in a more cohesive One IT experience and increased velocity of teams. The large-scale, layered storytelling approach made the framework resonate to the larger organization. It allowed framework users to explore the underlying data below the themes to find their own meaning. It also seeds design investigations of features and possible interaction models. This approach to socializing and utilizing the experience framework provides a practical model for the creators of other types of experience themes to more quickly trigger UX transformation in their own spaces.

When working with teams, we discovered creative ways to utilize "big data" past its original role in deriving the framework. By intersecting the over-arching user data with data specific to an enterprise product or service, we discovered new insights about user expectations of their product and how their product needed to align with the over-arching IT experience. The teams gained a much needed understanding of how their users utilized other enterprise products, and their preferences, which helped them more easily make decisions to ensure alignment with the overall user vision.

6.1   Key Learnings

The experience framework is being used across various levels of enterprise products and services to feed UX strategy, technical architecture, and the design of specific products. As a result, new learnings have emerged about how to most effectively integrate into portfolio strategy and design. Key lessons learned include

- Teams should use the qualities to evaluate their own product at the start of using the framework; it is key to learning and provides a baseline for improvement.
- Experience quality cards are paramount for setting vision and strategy. They spark conversation and provide easy functionality checklists to feed UX roadmaps.
- Product teams need experience element cards that provide user requirements, scenarios, and key audience differences once they move from strategy to design.
- Sample designs that embody the experience themes and elements are important to spark new ideas or conversations about how the pattern can be improved.
- Different people have different learning styles and different teams have different ways to work together. If collateral doesn't resonate, iterate, iterate, iterate.
- We have found that generating design ideas is often fastest when you have a hard-copy of element cards and other experience theme collateral so participants can "re-use" collateral elements in discussions and prototyping.

6.2   Key Challenges

There are multiple challenges with an effort of this size. Discovering great experience solutions is as much about collecting and analyzing user data as it is about transforming an organization to actually use it effectively. It's a journey – not a silver bullet. Transforming an organization, a team, or an individual to be 'experience driven' doesn't happen overnight and it doesn't happen just because you have a framework. It's a collaborative process that requires joint partnership and extensive collaboration.

Making the Story Consumable. The size of our dataset made keeping the UX story consumable extremely difficult. How do you turn mountains of user data into a framework that can be digested by a diverse audience? We answered this challenge by developing a multi-layered storytelling approach which included a variety of collateral forms – from vision books to quality cards, element cards, and reference sheets. We also created job aids, including an evaluation spreadsheet that allows teams to grade their solution according to the framework. Even with the wide range of collateral available, teams can still find it unwieldy to work with, especially in the beginning. Newcomers can easily lose their way in the multi-layered story so we work directly with teams to help them understand the framework.

Exponentially Increasing Big Data. In the two years since the introduction of the framework, the underlying data set has grown 275% and the supporting story-telling collateral has grown by 870%. That's a lot of information for anyone to digest and maintain. While the challenges of use are large, the value of incorporating additional data in the framework is immense. Increasing the variety of data allows us to identify correlations of activities, allowing us to refine the enterprise footprint to increase our understanding of user behavior and needs. Lastly, although collateral growth is beginning to stabilize based on active use by Intel IT project teams, the underlying data set is expected to grow even more rapidly in coming years as analysis tools become capable of handling even larger data sets. Only about 30% of available user transactional data has been incorporated in the current framework and the amount of data continues to increase on a daily basis further exacerbating the challenges of re-use and sense-making by project teams.

Enabling Social Storytelling and Knowledge Sharing. The framework and collateral put a face to the big data and provide an approach to defining a unified enterprise experience, but they are merely the tip of the iceberg of potential insights that could be derived from the underlying data set. Today, storytelling is primarily limited to the research team that produced the experience framework or the UX professionals who work directly with them. The rich data available on individuals, specific job roles, different organizations, and geographic areas makes possible a great many more stories than our current collateral. The lack of "self-service" environments to enable utilization of the data limits its broader utilization.

The majority of our collateral resides in flat files or posts in social media forums. The framework has not yet been brought to life online and no easy methods exist for teams to share outside of forum posts. Until the structure is available online and annotatable, widespread sharing and associated efficiencies are unlikely to occur. We need to enable project teams to not only re-use existing knowledge but also to add to it with detailed stories of use and new data.

Experience-Driven Transformation Is a Journey. Even with an experience framework, experience-driven transformation is a journey and what works for one team or individual may not work for another. A corporation's internal culture can also inhibit knowledge sharing if there is internal competitiveness and a reluctance to share information such as datasets and experience artifacts (e.g. personas, scenarios, or design patterns). It takes time, resources, and a willingness to collaborate with the rest of the organization. Every team or individual starts from a different point of faith and understanding of what UX is and how to do it. We have all had to transform our thinking, approach, decisions, and actions – from how we do user research to individual decisions made on enterprise projects all the way up to architectural and overall strategy decisions for IT. We celebrate the small and big wins where we see the framework is used to drive strategy and design. We never expected Intel IT to shift overnight and the journey is still in-progress but there have been big shifts. As researchers, we must maintain agility and flexibility with the teams but make sure they understand the hard work ahead.

7   Conclusion

In a world where businesses are constantly expected to move faster and workers become increasingly sophisticated in their expectations of technology, an experience framework can help speed up the business and become a force for UX transformation. This hybrid approach is a fundamental shift in the management of the business experience from the perspective of UX and enterprise IT. By aggregating big data and the outputs from more traditional UX together, UX teams can more quickly seed UX within businesses. By connecting user stories to big data we can understand if our insights from qualitative studies are generalizable to larger groups of business users. Presenting big data in ways typically used by traditional UX (e.g., personas) can make it more accessible. Together, big data and UX data are more powerful.

The experience framework defines interaction norms across enterprise tools and serves as design guard rails to help developers create better interfaces. A common framework and language understood by all results in more productive team discussions that generate strategy and design ideas faster. However, transformation using the framework is possible only when the findings are communicated in various ways so that it resonates with the broad base of people who work together to define and develop the workplace experience. A developer will look at the framework collateral thru a different lens than a business analyst or a service owner. Furthermore, transformation is a participatory process—it is not something that can be done by merely

throwing the framework over the wall to the business. For change to happen, all levels of the organization must participate in the conversation and take ownership of how their own role impacts the enterprise experience. The road to transformation that is paved by an enterprise framework is often hard, uphill, and fraught with challenge, but for those who take this journey, an experience framework can help seed a shared vision and light the way for the action needed to bring the vision to life and significantly improve the business user experience.

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